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ABSTRACT

This document is an overview of the status and problems of secondary technology education as it is now implemented in Taiwan. The first section describes the country and gives statistics on the national population and on the school population. The second section describes the technology curriculum as one in transition, with its focus changing from traditional industrial arts to contemporary technology education. Two tables provide summaries of the objectives and content of junior-high and senior-high industrial arts curriculum. The third section identifies problems that afflict industrial arts education in Taiwan--industrial arts is considered a subordinate subject, the public's perceptions are not aligned with what the field is, some drawbacks exist in the promulgation system of the curriculum standards, and much teaching deviates from the curriculum standards. The fourth section cites the 1993 extension of 9-year national education to 12 years as a good opportunity to rename industrial arts, develop a progressive philosophy, reconstruct the industrial arts curriculum, and win the public's support for industrial arts education. A summary, 11 references, 1 figure, and 2 tables conclude the document. (CML)

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A Perspective of Technology Education in Taiwan, Republic of China

Paper presented at
the International Technology Education Association
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Abstract

The purpose of this paper is to state an overview of the status and problems of technology education as implemented at the secondary level in Taiwan, Republic of China. The aspects associated with technology education--educational system, enrollment, curriculum, facilities, teacher education, etc.--are discussed.

In order to highlight the status and problems of technology education (henceforth called "industrial arts") as implemented at the secondary level (junior high and senior high) in Taiwan, Republic of China, this paper first briefs today's education in Taiwan, then discusses the aspects associated with industrial arts--the enrollment, curriculum, facilities, teacher education, etc.

A Brief of Today's Education in Taiwan

The Republic of China was founded in 1911 and moved its seat of government from mainland China to Taiwan in 1949. Situated at the far western Pacific, Taiwan covers an area of 36,000 square kilometers (13,899.7 square miles), about 3.8/1000 of the area of the USA (9,404,253.69 square kilometers or 3,631,000 square miles), and has a population of 20 million. Its population density--556 persons per square kilometer--is one of the highest in the world and is over 20 times the population density of the USA. In Taiwan, the absence of rich natural resources mandates that the workforce be highly productive in order that industry may be competitive; hence, for economic development to occur a comprehensive educational system is needed to effectively develop the dense population into productive manpower.

The core of today's educational system in Taiwan (see Figure 1) is the nine-year national education ("Kuo Ming Chiao Yu") which is compulsory and includes a six-year elementary school and

a three-year junior high school. Beyond these are two parallel three-year institutions--a senior high school and a senior vocational school. Junior college education assumes three patterns: a two-year program, a three-year program, and a five-year program. The university program lasts four to seven years, depending on variations within departments. The technical college offers two kinds of program: a two-year program for junior college graduates and a four-year program for senior vocational-school graduates. At the graduate level, the minimum length of study for a master's degree is two years, with an additional two years as the minimum required to earn a doctorate. Entrance examinations are required for admission to schools beyond the level of nine-year national education (Lin, 1985).

Insert Figure 1 about here

In the 1988-89 school year, the percentage of children of elementary-school age enrolled in school was 99.9 percent; the percentage of elementary-school graduates entering junior high school was 99.1 percent; the percentage of junior high graduates entering senior secondary school was 79.5 percent, and 45.5 percent of senior secondary graduates advanced to higher education (Ministry of Education, 1989b).

Technology Education Status: Curriculum in Transition

In Taiwan, curricula for elementary, junior high, and senior high schools are promulgated by the Ministry of Education. Curriculum standards for all levels of school are revised about every 10 years. Revision is made by subcommittees; the members, appointed by the Ministry of Education, are curriculum specialists, teacher educators, classroom teachers, and administrators.

Hence, according to current junior high and senior high curriculum standards[1] (Ministry of Education, 1983a & 1983b), which were promulgated in July 1983 and have been implemented since August 1984, students in grades seven to 11 (the first three grades are at junior high level, whereas the last two are at senior high level) must select either industrial arts ("Kung I"), or home economics with a two-hour weekly study (a regular week is 32 to 39 hours). Actually, schools usually assign boys to industrial arts programs and girls to home economics. In addition, some elective courses pertaining to industrial arts, like drafting, metalworking, and electronics shop, are also provided at both junior and senior high levels, but they are more vocational-oriented (characterized by "learning for earning") than the required industrial arts (characterized by "learning for living").

As shown in Tables 1 and 2, the objectives and content of

industrial arts education in Taiwan is undoubtedly industry-based and technology-oriented. Its curriculum focus is in transition from traditional industrial arts to contemporary technology education and its content category seems to mix broad occupational areas (like Woodworking) with industry clusters (like the Manufacturing Industry).

Insert Tables 1 and 2 about here

For facilitating the implementation of industrial arts curriculum standards, the following significant efforts have been conducted:

1. Industrial Arts Equipment Standards are promulgated by the Ministry of Education after each curriculum standard revision to set up the minimum requirements of industrial arts facility and equipment.
2. Junior-high industrial arts textbooks are compiled and printed by the National Institute of Compilation and Translation, an institution of the Ministry of Education, and commercial senior-high industrial arts textbooks also have to be approved by the institute.
3. Sponsored by the Ministry of Education or the departments/bureaus of education in provincial/special municipal governments, a variety of in-service teacher training programs are provided for industrial arts;

almost all the enrollments of these training programs are free of charge.

4. Through the recognition of outstanding industrial arts teachers, the annual convention, publications, etc., the Chinese Industrial Arts Education Association devotes its energies to the improvement of industrial arts education at all levels.
5. The Journal of Industrial Arts Education, edited by the Department of Industrial Arts Education at National Taiwan Normal University, are disseminated monthly, free of charge, to secondary schools and other institutions pertaining to industrial arts education.
6. Funded by the Ministry of Education or the departments/bureaus of education in provincial/special municipal governments, serial publications and teaching aids are often provided for industrial arts teachers.
7. The industrial arts consultative team, composing industrial arts teachers, supervisors, principals, is organized at every county and city to serve junior high industrial arts teachers.
8. The yearly industrial arts project exhibition or/and student contest is/are respectively held at county/city and province/special municipality levels.

In addition, there are two departments of industrial arts education in Taiwan, one at the National Taiwan Normal University

and another at the National Kaohsiung Normal University, to provide both pre-service and in-service secondary school teacher training programs. In terms of the pre-service program, students are admitted by the yearly College Joint Entrance Examination (CJEE) from senior-high schools. During their five-year period of study in the program, students enjoy a four-year tuition-waiver and living expenses in their universities then spend one year in secondary schools for a teaching internship. In recent years, there have been around 100 graduates from the two departments of industrial arts education every year; and, most faculty members in these two departments have had plenty of chances to devote themselves in a variety of efforts to improve industrial arts education.

Technology Education Problems: Struggling in the Public's Weak Concerns

Under the definition that a problem refers to "a significant discrepancy between an existing degree or amount of a characteristic [to be or the actual] and a preferred degree or amount of that characteristic [ought to be or the ideal]" (Friedman, Brinlee, & Hayes, 1980, p. 16), today's industrial arts education in Taiwan has the following problems which are in a descending order of priority.

Industrial Arts Is Seen as a Subordinate Subject

Since both of the entrance examinations for senior high school and college/university admission are very competitive[2] and industrial arts is not included in the required subjects for these examinations, most parents, principals, teachers, and even students in secondary schools see industrial arts as a subordinate subject which is unworthy to make much contribution.

The Public's Perceptions are not Aligned with What the Field Is

The current name of industrial arts "Kung I" was translated from American "industrial arts" in the 1950's, but the term "Kung I" has been used in Chinese society for thousands of years. Early, "Kung I" in Chinese language refereed to polytechnic or technology, but, it has widely been seen as the equivalent of handicraft after the western civilization was tremendously introduced into China at the turn of this century. Hence, it is difficult for professionals in the field of industrial arts education to communicate the ideas of this field with the public.

Furthermore, with the public's perceptions, the educational administrators admitted numerous personnel who majored in fine arts or its related discipline to be qualified industrial arts teachers in the 1960's. Many of these so-called "industrial arts teachers," especially those who have been unwilling to attend in-service teacher training programs, have become the barriers against the improvement of technology-oriented industrial arts education.

Some Drawbacks Exist in the Promulgation System of the Curriculum Standards

Based on Lee's studies (1986, 1987, & 1988), some drawbacks of the centralized industrial arts curriculum standards' promulgation have been indicated as follows:

1. The revision interval is too long, so the standards are unable to promptly reflect social changes.
2. The standards lack flexibility, so they are unable to meet variations of districts and students.
3. Its decision-making process is too teacher educator -oriented; the teacher-based claim is neglected.
4. Its process leans toward an arbitrary judgment because few related professional inquiries such as situation analysis, experiments, and follow-ups have been done.

Many Teachers' Teaching Deviates from the Curriculum Standards

Admittedly, the implementation of curriculum standards mainly depends upon the teacher's teaching. However, it is evident that industrial arts teachers' teaching in Taiwan has widely deviated from the center of the ideal curriculum prescribed by the curriculum standard. Undoubtedly, the deviation could be a desirable modification of the criticized curriculum standard, but unfortunately almost all deviation has led toward a worse direction (Lee, 1987). The two predominate factors to cause the deviation are:

1. Teachers' inertia

   As mentioned above, industrial arts has not been a subject required by the entrance examinations to admit to senior high schools and colleges/universities. Hence, lacking of serious supervision and desirable expectation, many industrial arts teachers are dull or unable to reflect curriculum change in their teaching. Especially, the thirteen sub-categories of junior high industrial arts curriculum, mixing broad occupational areas with industry clusters, are really too many to be managed well.

2. Teachers' overload

   At present, each industrial arts teacher is confronted by a big class size--in average, 46 students--and about 23 teaching hours per week (more than the hours of most teachers teaching other subject). The overload has them often "cut the feet to fit the shoes"--trim instructional activities to afford what they can handle.

When the industrial arts had its name change from "Arbeit" (German word meaning "work") in the early 1960's, Wang (1960), who was the director of the Department of Secondary Education, Ministry of Education and in charge of secondary schools' curricular revision at that time, cited a Chinese fable as follows to claim the appropriate position of industrial arts in general education.

> In the past, an expert in general education, who thought the 3R's--reading, writing, and arithmetics were the whole of general education, hired a boat to pass a river. While the boat was crossing the river, he chatted away to the boatman. First, he asked, "Can you read?" The boatman answered, "No." He told the boatman, "You lost one third of your life." He then asked if the boatman could write; the boatman's answer was also negative. "You lost two thirds of your life.", said the expert. After a moment, the boat was in the middle of the river and the wind made the boat pretty unstable. The boatman asked the expert, "Can you swim?" The expert answered, "No." with fear. The boatman complacently said, "If the boat turns over, you will lose the whole of your life." (p. 9)

The fable indicates that descriptive, prescriptive, and formal knowledge (can be linked to 3R's) is not enough for youngsters learning in general education; praxiological knowledge (can be linked to swimming) has to be offered in schools also (Towers, Lux, & Ray, 1966). Admittedly, since industrial arts education in Taiwan was greatly influenced by the USA in the 1950's[3], industrial arts in Taiwan has been appropriately seen as an action-based study of functional literacy (like swimming in the above fable) in general education. Owing to the preceding problems, however, industrial arts education is still "swimming up the stream".

Future Efforts:
Focus on the Coming Curriculum Change

In accordance with the plan to extend the nine-year national education to that of 12 years in 1993, the industrial arts curriculum standards are expected to be revised in the coming two years and the student's formative performance on all subjects in junior high school could be consider as the criteria to admit him/her to his/her preferred senior high or senior vocational school. This hopefully seems to be a good opportunity for the professionals in this field to rename industrial arts, develop a progressive philosophy, reconstruct industrial arts curriculum, and win the public's support for industrial arts education.

Summary

Under a centralized strategy, industrial arts education in Taiwan are required for students (mainly, boys) in grades 7 to 11. In the process of transition and characterized by the industrial-base and technology-orientation, current industrial arts curriculum mixes traditional "industrial arts" with contemporary "technology education."

Although a variety of supports from governmental institutions for industrial arts education is evident, today's industrial arts education in Taiwan is still struggling with many problems which are mainly caused by the public's weak perceptions. It is anticipated that the coming curriculum

standards revision may have a profound improvement of industrial arts education.

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Footnotes

1. At the elementary level, industrial arts is a component of the broad-study subject "craft work" which consists of drawing, sculpture, design, industrial arts, horticulture, and home-making.

2. In 1988, for example, 112,327 applicants took the College Joint Entrance Examination (CJEE) and only 37,929 (33.76 percent of the total applicants) were admitted to one of the day-session programs in colleges or universities.

3. In 1953, under some American specialists' assistance, the Department of Industrial Education at Provincial Taiwan Normal College (now National Taiwan Normal University) was founded in Taipei, Taiwan. Since that, American industrial arts theory and practice have been tremendously introduced into Taiwan through frequent exchanges of Sino-America professional personnel and literature.

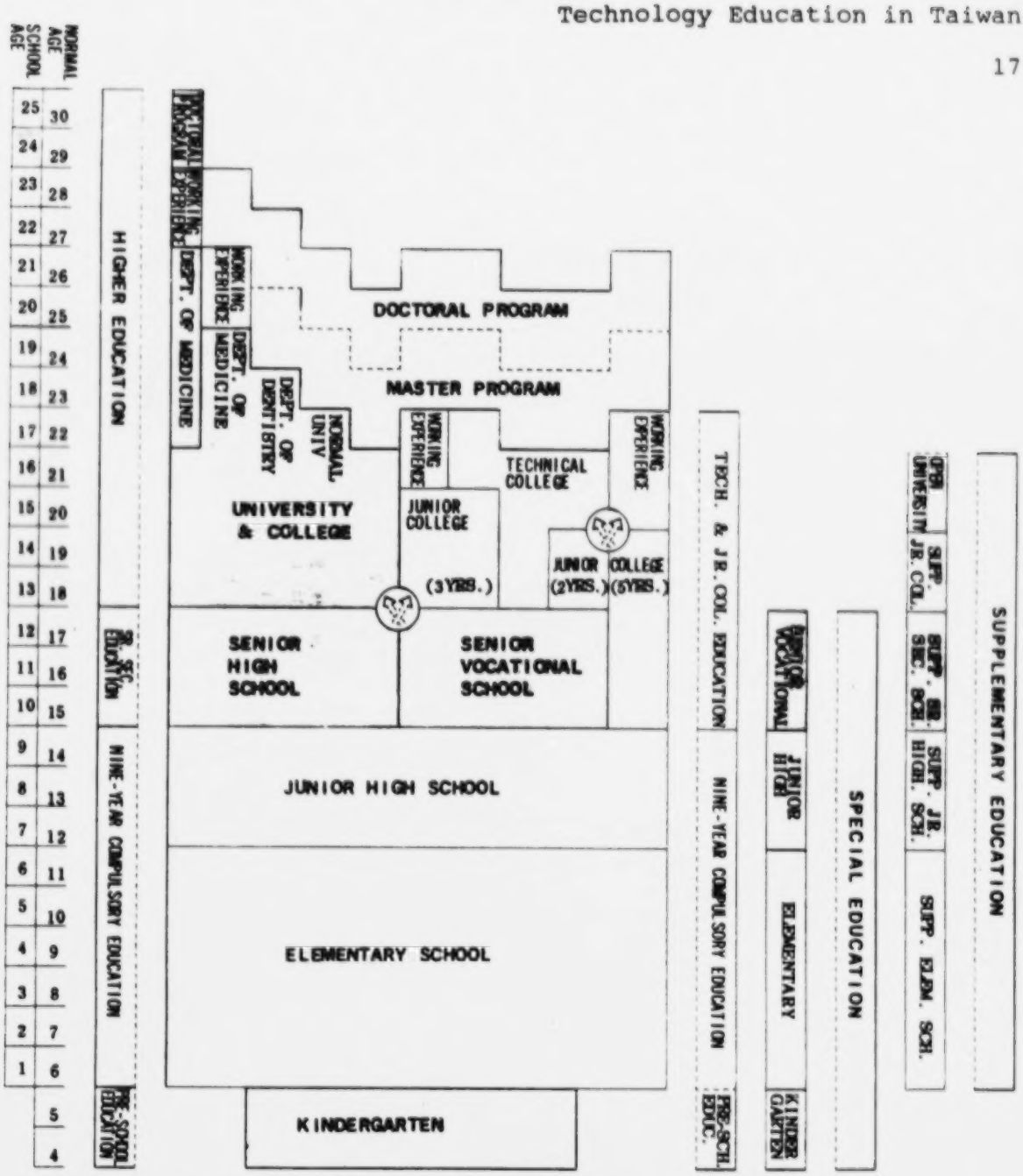

Figure 1. Structure of the educational system

Note. From Education in the Republic of China (p. 9) by Ministry of Education, 1989, Taipei, Taiwan: Author.

Table 1

A Summary of the Objectives and Content of Junior-high Industrial Arts Curriculum

Objectives	Content (allocated weeks)
1. To help students to understand traditional and contemporary industrial civilization and recognize their local industrial status and trends.	1. Introduction to Industrial Arts (2)
2. To provide students with career exploration opportunities to discover their interests and abilities in the field of industrial technology.	2. Blueprint Reading and Planning (6)
3. To develop students' necessary knowledge, skills, and attitudes for living in the industrial society.	3. Ceramics Shop (5)
4. To foster students' cooperative, industrious, companionate, and enthusiastic personalities.	4. Woodworking (15)
	5. Plastics Shop (5)
	6. Metalworking (15)
	7. Electricity Shop (7)
	8. Graphics Communication (4)
	9. Construction and Livelihood (9)
	10. Manufacturing Industry (12)
	11. Information Industry (6)

(table continues)

Objectives	Content (allocated weeks)
5. To develop students' consumer skills and knowledge.	12. Audio-visual Communication (7)
6. To foster students' habits to coordinate doing and thinking and ideas about dignity and equality in working.	13. Energy and Power (7)

Note. From "Junior-high Industrial Arts Curriculum Standard" by Ministry of Education, 1983, Junior-high Curriculum Standards (pp. 441-516). Taipei, Taiwan: Author.

Table 2

A Summary of the Objectives and Content of Senior-high Industrial Arts Curriculum

Objectives	Content (implemented grade)
1. To introduce students industrial technology knowledge and foster them industrial skills for their industrialized living and advanced studies. 2. To ignite students' interests of design and creation, provide them with career exploration opportunities in the field of industrial technology, and encourage them to do research and invention. 3. To develop students' appropriate working habits and attitudes.	1. Project Planning and Drafting (grade 10) 2. Industrial Materials (grade 10) 3. Energy Industry (grade 10) 4. Information Industry (grade 11) 5. Automation (grade 11)

Note. From "Senior-high Industrial Arts Curriculum Standard" by Ministry of Education, 1983, Senior-high Curriculum Standards (pp. 801-839). Taipei, Taiwan: Author.